Ontario

Ventilation Inspection and Report for Health Care and Residential Facilities

1. Introduction

The Regulation for Health Care and Residential Facilities (O. Reg. 67/93, s. 19) made under the Occupational Health and Safety Act (OHSA) requires that mechanical ventilation systems in the workplaces to which the regulation applies be inspected by a qualified person at least every six months. It also requires that a report on each inspection be filed with the employer and with the Joint Health and Safety Committee or the Health and Safety Representative, if any.

This guide identifies issues related to the inspection, service, and maintenance of ventilation systems to help employers and persons carrying out these tasks to determine how to comply with the requirements of the regulation and achieve a healthier workplace.

The two major types of mechanical ventilation systems, namely *general* ventilation (heating, ventilating and air-conditioning – HVAC) and *local exhaust* ventilation are discussed in this document.

2. Who is qualified to conduct the inspection?

The inspection must be carried out by a person who is qualified by training and experience to do so. He or she may be a worker in maintenance or some other area of the facility who has detailed knowledge of the system, and its operation and maintenance requirements. A qualified contractor with expertise in ventilation systems who is familiar with the system may also be qualified to conduct the inspection.

3. Keeping Records

It is recommended that information about each ventilation system be recorded and be kept readily available at the workplace. The record should include:

- the system's purpose, type, and the area(s) it serves
- relevant plans, drawings and specifications

- the manufacturer's literature for all operating equipment
- written standard operating procedures
- a written testing and/or preventive maintenance program
- testing and maintenance records, including reports of regular inspections by a qualified person, and
- emergency procedures to be followed when a toxic substance has been released and could enter the ventilation intake or return.

For an **air supply or re-circulating HVAC system**, the records should include descriptions of:

- the location of outdoor air intakes (components may include bird screen, outdoor air intake louvers and dampers) and air handling units
- air volumes and the percentage of outside air
- how the percentage of outside air is determined
- how fans, outside air dampers, exhaust dampers, supply diffuser dampers, temperature, humidity and air distribution are controlled
- type(s) of heating and/or cooling systems, if any
- type(s) of filters and their maintenance schedule, and
- maintenance programs for fan components, drive components, drain pans, traps, valves, nozzles, dampers and controls (including any continuous monitors of contaminant concentrations). Maintenance programs and records should state the type of biocide used and how frequently it is used.

Employers often find it helpful to keep a log or record of indoor air quality complaints and associated conditions.

Local exhaust ventilation systems, generally have four basic components: hood(s), duct network (including the exhaust duct, discharge stack and/or recirculation duct), air cleaning device and fan. The records for these systems should include descriptions of:

- hazardous substances (e.g., chemical and biological agents) and the operation(s) to be controlled
- number of hoods and their design
- construction material compatibility requirements
- rate of air exhausted for each hood and for the system

- location of dampers, if any
- flow monitors (e.g., hood static pressure gauges)
- type of air cleaning device, if any
- equipment failure alarms, if any
- duct materials
- fan type and materials, and
- the height and location of the stack.

4. The Inspection

A good way to help ensure that a ventilation system is operating properly is by regularly checking the direct measurement of air flow rates/velocities at appropriate points.

For laboratory ventilation (e.g., general use laboratory hoods), flow rate or face velocity measurements are good indicators of system performance. For a local exhaust ventilation system, hood static pressure measurements can also serve well. Details of how and where to measure air flow may be obtained from ventilation references, such as *Industrial Ventilation: A Manual of Recommended Practice for Design*, 27th ed., 2010, published by the American Conference of Governmental Industrial Hygienists (ACGIH).

Indirect methods of assessing outdoor air supply of a mechanical ventilation system can be used with assumptions and limitations. For example, carbon dioxide (CO_2) measurements may be used to assess the adequacy of general mechanical ventilation in general occupancy areas where human respiration is the main source of CO_2. However, this method is not appropriate for assessing ventilation adequacy in areas where hazardous airborne contaminants are being, or may be, released (e.g., sterilizer rooms, surgery and recovery rooms, incinerator rooms). Where CO_2 measurements are appropriate, they should be taken at a time of relatively high occupancy and under both summer and winter conditions. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standard 62.1- 2010 Ventilation for Acceptable Indoor Air Quality recommends an outdoor air ventilation rate of 17 cfm (cubic feet per minute) per person/8.5 litres per second per person for a typical office space, based on an estimated maximum occupancy of five (5) people per 1,000 ft^2 (100 m^2). At this ventilation rate, a steady-state CO_2 concentration of greater than about 600 ppm above outdoor levels in a typical office space (assuming that make-up air is of satisfactory quality and outside CO_2 concentrations are in the 300 to 500 ppm range) may indicate an insufficient supply of fresh outside air. This should trigger a visual inspection of the relevant ventilation system(s).

However, whether or not testing is done, for ongoing ventilation system effectiveness, regular visual inspections under a preventive maintenance program are necessary. Visual inspection is needed to ensure the integrity, cleanliness and proper operation of the system.
A list of some recommended items/ventilation system components to be checked during a semi-annual inspection is provided in Section 5.

5. The Semi-Annual Inspection Checklist

Check each of the following items, as applicable:

Isolation Rooms

- air flow from clean areas to less clean areas
- pressure differential between areas (minimum of 0.01 inch of water gauge/ 2.5 Pascals)
- monitoring and alarm of room pressure
- High Efficiency Particulate Air (HEPA) filtration of exhaust in airborne isolation rooms.

Exhaust Fume Hoods (e.g., General Laboratory Hoods)

- physical integrity
- blast gate and damper settings
- face velocity with the sash at normal operating height
- flow visualization (smoke tube test)
- signs of plugging, blockage
- unusual noise.

Outdoor Air Intake

- location in relation to exhausts (should be at least 15 feet/4.7 metres apart) and other outdoor potential sources of air contaminants
- dryness and cleanliness
- operation of motorized dampers
- standing water, bird droppings in vicinity

Air Filters

- type of filters
- filter efficiency
- cleanliness of filters
- signs of bypassing
- change-out schedule

Ductwork

- physical integrity
- dryness and cleanliness
- signs of blockage from static pressure measurements
- air balancing record

Reheat Coils/Mixing Boxes

- dryness and cleanliness
- VAV (variable air volume) calibration set for at least the minimum
- required outside air delivery at all times

HVAC Equipment (e.g., heating/cooling units, stacks and condensers)

- physical integrity
- dryness and cleanliness
- no slime, mould, dirt, bird droppings or soot accumulations
- integrity and cleanliness of chamber floor, wall and ceiling surfaces
- cleanliness and operation of various components.

Supply Air Diffusers, Return Air Grilles

- cleanliness
- no obstruction
- air balancing record.

Supply Air Fan

- correct direction of rotation and rotation per minute (rpm)
- static pressure drop across fan, if practicable
- pulley/belt tightness and wear
- guards in place
- assembly intact and clean
- minimal vibration
- acceptable noise level
- no loose nuts and bolts
- adequate bearing lubrication (as indicated by temperature and vibration)
- electrical connections and insulation intact
- fan wheel correctly mounted and not worn or dirty
- couplings and alignment for direct drive fans.

Humidifiers, Cooling Coils, Drain Pans

- cleanliness
- no slime or mould build-up
- drains clear and free-flowing
- no stagnant water accumulations
- no odours
- biocide treatment, where necessary

Cooling Tower

- proper and unobstructed drainage
- clean sump
- no leaks or overflow
- no slime or algae
- mist eliminators working with no carryover
- no stagnant water during non-operating season
- overall cleanliness – no bird droppings, slime, mould or dirt build-up.

Thermostats

- type and location
- set appropriately
- access controlled.

Note:

1. Inspect internal fan components only when the fan is off and locked out.
2. In assessing ventilation adequacy, the requirements of section 20 of the Regulation for Health Care and Residential Facilities must also be considered.
3. To prevent blockage or contamination of air intakes, more frequent inspection of these system components may be necessary.

6. The Report and Follow-up

The person conducting the semi-annual inspection is required to file a report with the employer and with the Joint Health and Safety Committee or the Health and Safety Representative, if any. It is recommended that the report states what was inspected, when and by whom. It should describe any deficiencies observed during the inspection. If deficiencies are found, action should be taken to correct them. Deficiencies and the corrective action(s) should be documented in the system records.

O. Reg. 67/93, s. 19 (5) requires mechanical ventilation system:

- to be serviced and maintained as frequently as recommended by the manufacturer, and
- to be serviced and maintained — or to be repaired — when a report referred to in subsection (4) indicates that this is necessary.

This guide has been prepared to assist the workplace parties in understanding their obligations under the Occupational Health and Safety Act (OHSA) and its regulations. It is not intended to replace the OHSA or its regulations and reference should always be made to the official version of the legislation.

It is the responsibility of the workplace parties to ensure compliance with the legislation. This guide does not constitute legal advice and has no legal effect. If you require assistance with respect to the interpretation of the legislation and its potential application in specific circumstances, please contact your legal counsel.

While this guide will also be available to Ministry of Labour inspectors, they will apply and enforce the OHSA and its regulations based on the facts as they may find them in the workplace. This guide does not affect their enforcement discretion in any way.

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